CLAIMS

1. A fixture for calibrating an instrumented fastener comprising:

an upper member;

a cap member removably attached to the upper member, the cap member including an opening formed therein to receive an upper portion of the fastener;

a lower member positioned adjacent the cap member, the lower member including an opening formed therein;

a removable insert positioned in the lower member opening to receive a lower portion of the fastener.

2. The fixture of claim 1 wherein the cap includes a joint specific spacer section to provide a predetermined position of the fastener within the fixture.

3. The fixture of claim 1 wherein the upper member includes a threaded extension for threaded attachment to the cap member.

4. The fixture of claim 3 wherein the upper member includes a chamber formed therein for receiving the upper portion of the fastener.

5. The fixture of claim 4 wherein the upper member further includes a port formed therein, the port allowing cable access to the upper member chamber.

6. The fixture of claim 1 wherein the cap member opening is a threaded opening.

7. The fixture of claim 1 wherein the cap member opening is an unthreaded opening.

8. The fixture of claim 1 wherein the lower member opening is a threaded opening.

9. The fixture of claim 1 wherein the lower member further includes a chamber formed therein.

10. The fixture of claim 1 wherein the lower member further includes a port formed therein, the port allowing cable access to the lower member chamber.

11. The fixture of claim 8 wherein the removable insert includes a threaded outer portion for threaded engagement with the lower member opening.

12. The fixture of claim 11 wherein the removable insert includes a threaded opening, the threaded opening including a configuration adapted to threadably engage the lower portion of the fastener.

13. The fixture of claim 12 wherein the removable insert is one of a plurality of removable inserts, each of which include a threaded opening adapted to threadably engage a fastener with a different engaging configuration.

14. The fixture of claim 1 wherein the upper member and the cap member comprise an upper section.

15. The fixture of claim 14 wherein the lower member and the removable insert comprise a lower section.

16. The fixture of claim 15 wherein the upper section and the lower section each include an attachment portion.

17. A method comprising:

positioning a fiber-optic sensor within a fastener;

positioning a removable insert member within a lower member of a calibration fixture;

positioning a cap member adjacent to the removable insert member;

inserting the fastener through an opening in the cap member;

screwing a lower threaded portion of the fastener into the threaded insert member;

attaching the cap member to an upper section of the calibration fixture;

operably connecting the fiber-optic sensor to a measuring device;

applying a predetermined tensile force to the fastener; and

recording a measurement from the fiber-optic sensor.

18. The method of claim 17 wherein the predetermined tensile force is applied to the fastener by applying a tensile force to the upper and lower members of the calibration fixture.

19. A system for calibrating an instrumented fastener comprising:

means for positioning a fiber-optic sensor within a fastener;

means for positioning a removable insert member within a lower section of a calibration fixture;

means for positioning a cap member adjacent to the removable insert member;

means for inserting the fastener through the cap member;

means for securing a lower threaded portion of the fastener within the threaded insert member;

means for attaching the cap member to an upper section of the calibration fixture;

means for operably connecting the fiber-optic sensor to a measuring device;

means for applying a predetermined tensile force to the fastener; and

means for recording a measurement from the fiber-optic sensor.

20. A system for calibrating an instrumented fastener comprising:

an upper assembly adapted to receive an upper portion of the fastener;

a lower assembly adapted to receive a lower portion of the fastener; and

means for attaching the upper and lower assemblies to a tension-producing device, wherein the application of a predetermined tensile force by the tension-producing device across the upper and lower assemblies produces a strain in the fastener detectable by the instrument.